

Alg. 2 Warm Up # 3-2

Solve:

1) $x^2 - 8x + 7 > 0$

2) $\frac{2}{5}|4x - 8| + 16 \geq 58$

3) $\log_x 16 = 4$

4) $\log_5(200 - x) = 3$

HW Questions:

CL 5-126. Quinten and his sister Kelsey always make a habit of undoing each other's work. If Kelsey folds the laundry, Quinten unfolds it. If Quinten rakes the leaves in the yard, Kelsey "unrakes" them! While working on her math homework, Kelsey wrote the following equations. Help Quinten undo these equations by finding their inverse equations.

a. $y = 3x - 2$

b. $y = \frac{x+1}{4}$

c. $y = x^3 + 1$

d. $y = 1 + \sqrt{x+5}$

d: $x \geq -5$
r: $y \geq 1$

$$x = 1 + \sqrt{y+5}$$

$$(x-1)^2 = (\sqrt{y+5})^2$$

$$(x-1)^2 = y+5$$

$$y = (x-1)^2 - 5; x \geq 1$$

CL 5-127. Given the function $f(x) = 2 + \sqrt{x-1}$:

a. Graph $f(x)$ and state the domain and range.

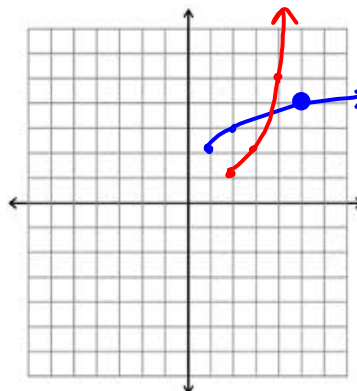
$$f^{-1}(x) = (x-2)^2 + 1, \quad x \geq 2$$

b. Determine the equation for $f^{-1}(x)$, that is, the inverse of $f(x)$.

c. Graph $f^{-1}(x)$ using the appropriate new domain and range.

d. Compute $f^{-1}(f(5))$ and $f(f^{-1}(5))$ to show that your answer is correct.

$$\begin{aligned} f^{-1}(f(5)) &= ((2 + \sqrt{5-1}) - 2)^2 + 1 \\ &= (-2)^2 + 1 \end{aligned}$$



CL 5-128. Use the definition of logarithms to compute each of the following *without using a calculator*.



a. $\log_8(64) = x$

b. $\log_9(x) = \frac{1}{2}$

c. $\log_3(3^4) = x$

d. $10^{\log_{10}(4)} = x$

e. What do the answers to (c) and (d) demonstrate about logs and exponents with the same base?

$$3^x = 3^4$$

$$\begin{aligned} \log_{10} x &= \log_{10} 4 \\ x &= 4 \end{aligned}$$

CL 5-129. Use the graph at right to help answer the questions below.

a. State the domain and range of the graph. Is this graph a function?

b. Draw the inverse of the graph. Is the inverse a function? Explain your answer.

c. State the domain and range of the inverse.

CL 5-130. A gallon of milk costs \$3.89. Inflation has steadily increased 4% per year.

a. What did a gallon of milk cost ten years ago?

b. How much longer will it be until it costs \$10?

Handwritten notes for CL 5-130:

- $x = -10$
- Multiplier = 1.04
- $y = 3.89(1.04)^x$
- $10 = \frac{3.89(1.04)^x}{3.89}$
- $1.04^x \approx 2.57$
- $x \approx 24.1$

CL 5-131. Perform the indicated operation on each of the following rational expressions. Be sure to state any values of the excluded variable and that your final answer is simplified. If a graphing tool is available, check the graph of the original problem to see if it coincides with the graph of your answer.

a. $\frac{5x}{x+3} + \frac{3+x}{x^2+9}$ $x \neq -3$

b. $\frac{x}{x-1} - 1$ $x \neq 1$

c. $\frac{x^2+5x+6}{x^2-4x} \cdot \frac{4x}{x+2}$ $x \neq -2, 0, 4$

d. $\frac{x^2-2x}{x^2-4x+4} + \frac{4x^2}{x-2}$ $x \neq 2, 0$

Handwritten work for problem a:

$$\frac{5x}{(x+3)(x^2+9)} + \frac{(3+x)}{(x^2+9)(x+3)}$$

$$\frac{5x \cdot (x^2+9) + (3+x) \cdot (x+3)}{(x+3)(x^2+9)}$$

Handwritten work for problem b:

$$\frac{x}{x-1} - \frac{x-1}{x-1}$$

$$\frac{x - (x-1)}{x-1}$$

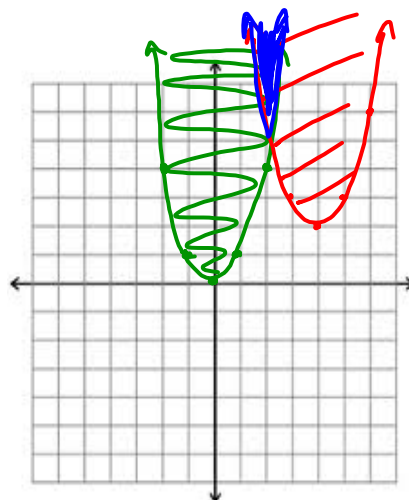
Handwritten work for problem c:

$$\frac{(\quad)(\quad)}{x(x-4)} \cdot \frac{4x}{(x+2)}$$

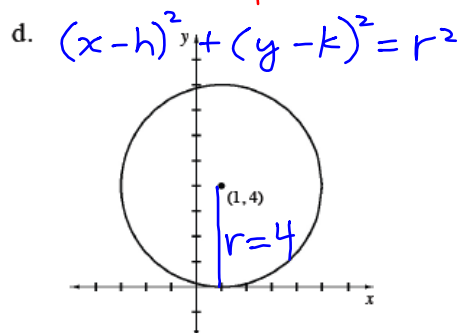
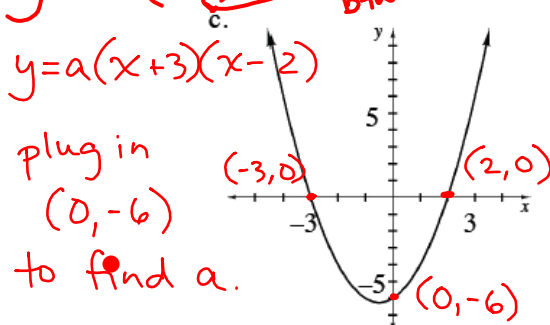
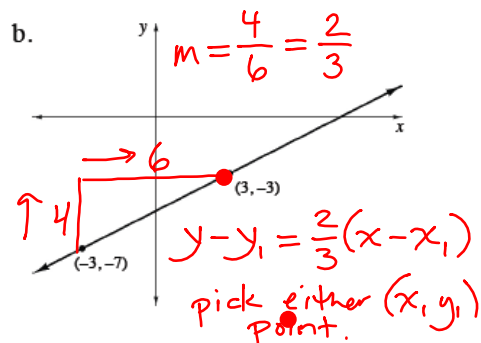
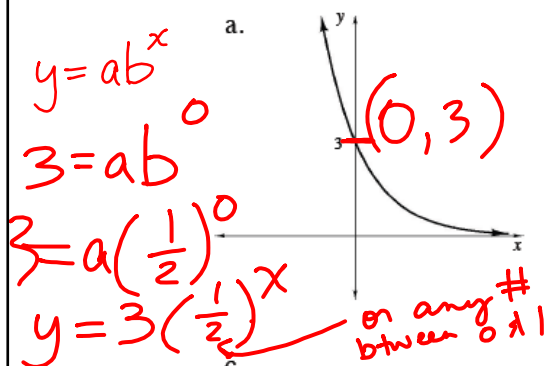
Handwritten work for problem d:

$$\frac{x(x-2)}{(x-2)^2} \cdot \frac{(x-2)}{4x^2}$$

CL 5-132. Graph the system of $y \geq x^2$ and $y \geq (x-4)^2 + 2$ and shade the inequalities' overlapping region. How is the graph of $y \geq (x-4)^2 + 2$ positioned in relation to the graph of $y \geq x^2$?



CL 5-133. Write possible equations for the graphs shown below.



CL 5-134. Factor the expressions below.

a. $3x^2 + 11x + 10$

b. $6x^3 - 31x^2 + 5x$

c. $6ab^2 + 15ab - 21a$

d. $y^2 + 5y - 24$ $x(6x^2 - 31x + 5)$
 $x(\quad \quad)$

$3a(2b^2 + 5b - 7)$
 $3a(2b \quad)(b \quad)$

$f(x) = 4x + 5$

$g(x) = (x - 3)^2 + 1$

$f(g(2)) = 4(g(2)) + 5$ $g(f(-3)) = [(f(-3)) - 3]^2 + 1$

$= 4((2-3)^2 + 1) + 5$ $= [(4(-3) + 5) - 3]^2 + 1$

$= 4(1 + 1) + 5$ $= [(-12 + 5) - 3]^2 + 1$

$= 4(2) + 5$ $= (-7 - 3)^2 + 1$

$= \boxed{13}$ $= \boxed{101}$

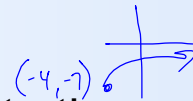
Now with just x:

$$f(x) = 4x + 5 \quad g(x) = (x - 3)^2 + 1$$

$$\begin{aligned} f(g(x)) &= 4((x-3)^2 + 1) + 5 \\ &= 4(x^2 - 6x + \underline{9 + 1}) + 5 \\ &= 4(x^2 - 6x + 10) + 5 \\ &= 4x^2 - 24x + 40 + 5 \\ f(g(x)) &= 4x^2 - 24x + 45 \end{aligned}$$

Test practice:

Write the inverse equation and state the domain and range for both.



a) $y = (x - 6)^2 + 8$

dom: $x = \mathbb{R}$

range: $y \geq 8$

$y = \pm\sqrt{x-8} + 6$

dom: $x \geq 8$

range: $y = \mathbb{R}$

b) $y = 2\sqrt{x+4} - 7$

dom: $x \geq -4$

range: $y \geq -7$

$y = \frac{1}{2}(x+7)^2 - 4$

dom: $x \geq -7$

range: $y \geq -4$

HW: Tan Ch. 5 Review WS

Chapter 5 test tomorrow:

Absolute Value Inequalities

Quadratic Inequalities

Factoring

Exponents

Inverses

Basic Logarithms

Chapter 6 starts Thursday.
Exchange your book for Vol. 2!